

# Today's Agenda

2/14/

→ Homework (Pass Up)

→ Do Now [10 minutes on the clock]

## Unit Circle Time

... ——— Where you at? Where you at? ——— ...

Remind me... (MIXED REVIEW)

[Give me an angle measure that is co-terminal to  $1325^\circ$ ]

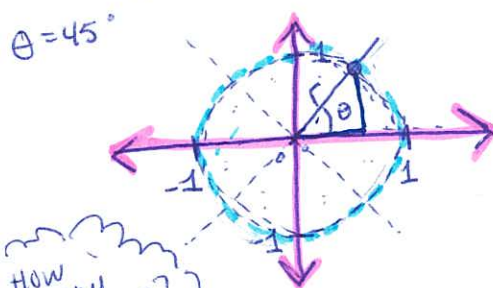
first 4 without going around the plane more than 1.

⇒ [Convert  $240^\circ$  to Radians]

what's a radian in relation to arc length?  
def: a central angle that subtends the arc of a circle such that, the arc length is equal to the radius.

what does that look like though.

Construct a graph of a circle  $r=1$



How many pieces?

Now hold up... looking at this; a triangle

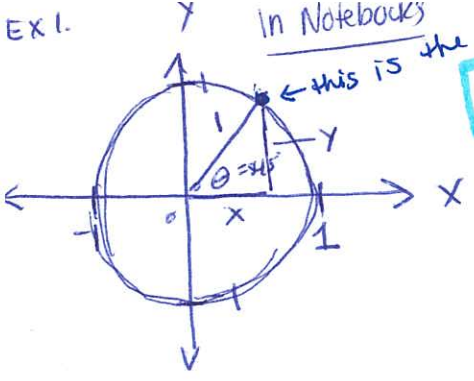
• what is  $r=1$ ; How do you know?  
• OK so check this out;

→ if  $r=1$  [what is the value of the circle?]  
→ [what is the distance around a circle equal to?] —  $C = 2\pi r$

We have a  $45^\circ$  angle; let's make see what we can prove.

1

EX 1.



In Notebooks

[Where is the adjacent side to  $\theta$ ?]  
lets do it  $\cos \theta = \frac{x}{1}$   
 $\rightarrow x$   
so  $x = \cos \theta$

[Where is the opposite side to  $\theta$ ?]  
 $\rightarrow y$  lets do it...  
 $\sin \theta = \frac{y}{1}$   
 $y = \sin \theta$

if I wanted to check my answer what's that formula I can use?

Pythagorean  $\rightarrow a^2 + b^2 = c^2$

$\downarrow$  apply it to the unit circle.

$x^2 + y^2 = 1^2$

go deeper

$\cos^2 \theta + \sin^2 \theta = 1$

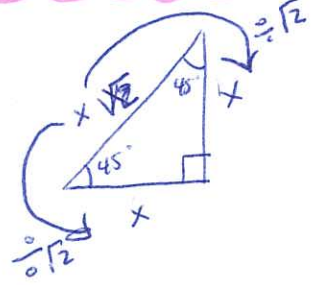
what is x what is y?

14, 8, 15

GET these Down!

Let's review...

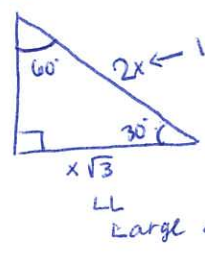
45-45-90  $\Delta$



30-60-90  $\Delta$

SL Small  $\Delta$

$x=1$



LL Large  $\Delta$

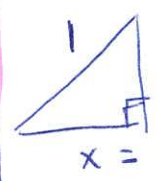
I know for sure... but the others which is which??

OK, lets go back  $\uparrow$  EX 1.

$\Rightarrow$  Look at #10 how would I do that?

[What's ~~x~~ again in terms of the trig functions?]

sine



$x = \frac{1}{\sqrt{2}}$

$\frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

now  $y = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

what's  $y$ ?  $\leftarrow$  cosine

try Practice #1 on your own. answer it.



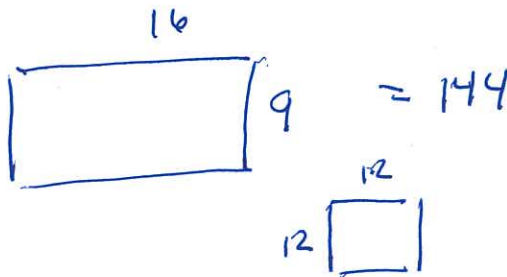
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- A diagram of a rectangular pasture. A compass rose is located to the left of the pasture, with 'N' at the top, 'S' at the bottom, 'W' to the left, and 'E' to the right. The pasture is a rectangle with a wavy blue border. Handwritten blue numbers indicate dimensions: the top side is 30, the right side is 10, the bottom side is 20, and the left side is 20. The word 'pasture' is written in the center of the rectangle.

$$\begin{array}{r} 70 \\ + 30 \\ + 30 \\ + 10 \\ + 20 \\ + 20 \\ + 20 \end{array}$$

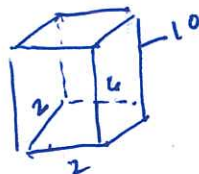
$\frac{+20}{200} + \text{diagonal}$   
 $> 10 \text{ ft apart}$

- 12/24/20

- E. 16




- E 12



$$V = l \cdot w \cdot h$$

$$120$$

  $= 15 \times h = 120$   
 $n = 8$

Positive:  $\sin, \cos, \tan (+, +)$   
Negative:

The diagram shows a unit circle in the first quadrant. The x-axis is labeled with  $0^\circ$  and  $360^\circ$  (or  $2\pi$ ). The y-axis is labeled with  $90^\circ$  and  $\pi/2$ . The circle is divided into segments by lines from the origin to the circle at angles of  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ , and  $90^\circ$ . The corresponding angles in radians are  $\pi/6$ ,  $\pi/4$ ,  $\pi/3$ , and  $\pi/2$ . The coordinates of the points on the circle are labeled as  $(\cos \theta, \sin \theta)$ . The values are:  $(1, 0)$  at  $0^\circ$ ,  $(\sqrt{3}/2, 1/2)$  at  $30^\circ$ ,  $(\sqrt{2}/2, \sqrt{2}/2)$  at  $45^\circ$ ,  $(1/2, \sqrt{3}/2)$  at  $60^\circ$ , and  $(0, 1)$  at  $90^\circ$ . The diagram also shows the signs of the trigonometric functions in the first quadrant:  $\sin$  is positive,  $\cos$  is positive, and  $\tan$  is positive.

- $$\underline{r^2 = x^2 + y^2 ; r = 1}$$

- $$y = \sin \theta$$

- In terms of sine and cosine of  $\theta$ :  $\sin \theta / \cos \theta$

CW#6H: Unit Circle: Quadrant 1  
Honors Geometry

## MEMORIZE THIS!



<p>1. Find <math>\sin \frac{\pi}{3}</math> with respect to the unit circle.</p> $\sin = y = \sqrt{3}/2$	<p>2. Find <math>\cos 90^\circ</math> with respect to the unit circle.</p> $\cos = x = 0$
<p>3. Find <math>\cos 45^\circ</math> with respect to the unit circle.</p> $\cos = x = \frac{\sqrt{2}}{2}$	<p>4. Find <math>\sin \frac{\pi}{2}</math> with respect to the unit circle.</p> $\sin = y = 1$
<p>5. Find the coordinates of <math>\frac{\pi}{6}</math>.</p> $\left( \frac{\sqrt{3}}{2}, \frac{1}{2} \right)$	<p>6. Find the coordinates of <math>\theta = 45^\circ</math>.</p> $\left( \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right)$
<p>7. Find the coordinates of <math>0^\circ</math>.</p> $(1, 0)$	<p>8. Find the coordinates of <math>\frac{\pi}{3}</math>.</p> $\left( \frac{1}{2}, \sqrt{3}/2 \right)$
<p>9. <math>(0, 1)</math> is the coordinate for what angle measure?</p> $90^\circ$	<p>10. What angle measure has an x-coordinate of <math>\frac{\sqrt{3}}{2}</math>?</p> $60^\circ \text{ or } \pi/3$
<p>11. Find the exact radian measure (no decimals) of</p> <p>a). <math>240^\circ</math>                      b). <math>-330^\circ</math></p> $\frac{4\pi}{3} \qquad \qquad \qquad -\frac{11\pi}{6}$	<p>12. Find the degree measure of each angle.</p> <p>a). <math>-\frac{5\pi}{4}</math>                      b). <math>\frac{3\pi}{2}</math></p> $-225^\circ \qquad \qquad \qquad 270^\circ$
<p>13. A straight line inserted at the origin terminates at the point <math>(3, 2)</math> as it sweeps out an angle <math>\theta</math> in standard position. Evaluate all <u>three</u> trig functions of <math>\theta</math>.</p> $3^2 + 2^2 = r^2 = \sqrt{13} = r$ <p>a. <math>\sin \theta = \frac{y}{r} = \frac{2\sqrt{13}}{13}</math>      b. <math>\cos \theta = \frac{x}{r} = \frac{3\sqrt{13}}{13}</math>      c. <math>\tan \theta = \frac{y}{x} = \frac{2}{3}</math></p>	<p>14. What is the value of the expression <math>\cos^{-1}(-1)</math>?</p> <p>Inverse; find angle with an x-value of -1</p> $= \pi \text{ or } 180^\circ$

# QUIZ PRACTICE: No Calculators. SHOW ALL WORK!

Find the **exact** value of each trigonometric function:

15.  $\cos \pi = 180^\circ$   
 $x\text{-value} = -1$

unit circle

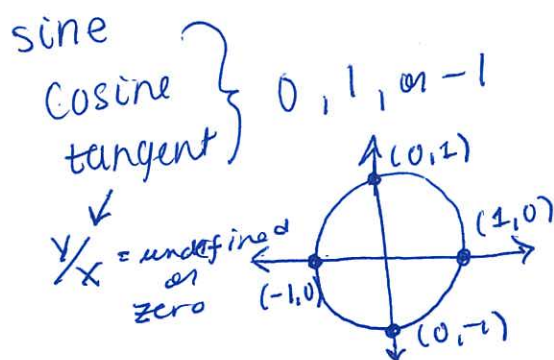
17.  $\tan \frac{2\pi}{3} = 120^\circ$   
 $y/x = \left( \frac{\sqrt{3}}{2} \times \frac{2}{-1} \right) = -\sqrt{3}$

19.  $\sin \frac{10\pi}{8} = \sin \frac{5\pi}{4}$   
 $y\text{ value at } \frac{5\pi}{4} = \frac{-\sqrt{2}}{2}$

21. Explain why we can write the following, where  $n$  could be any integer:

$n$  is;  
 odd  $\Rightarrow \cos n\pi$  is coterminal w/  $\pi$ , and  $(-1)^n = -1$   
 even  $\Rightarrow \cos n\pi$  is coterminal w/  $0$ , and  $(-1)^n = 1$

23. For a quadrantal angle, what are the **only** values that can define sine, cosine, and tangent of  $\theta$ .



25. What is the value of the expression  $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ ?

inverse; need an angle.  
 $\sin = y\text{ value at } -\frac{\sqrt{2}}{2}$   
225° and 315°

16.  $\sin \frac{7\pi}{4} = 315^\circ$   
 $y\text{-value} = -\frac{\sqrt{2}}{2}$

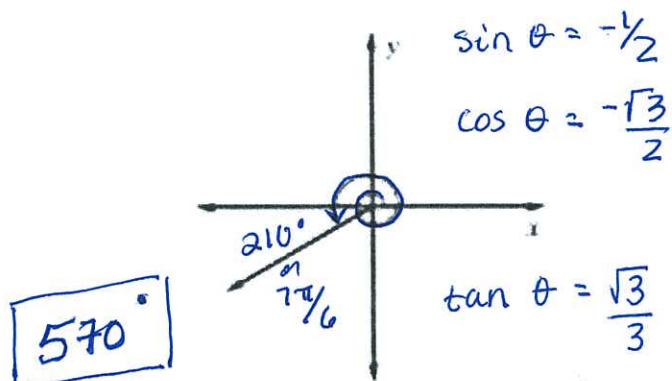
18.  $\tan \frac{5\pi}{6} = 150^\circ$   
 $y/x = \left( \frac{1}{2} \times \frac{2}{-\sqrt{3}} \right) = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

20.  $\cos \frac{11\pi}{6} = 330^\circ$   
 $x = \sqrt{3}/2$

22. **True or False**  $\tan \frac{\pi}{2}$  has an exact value. Explain your answer using the unit circle.

$\pi/2 = 90^\circ$   $\tan = y/x = y/0 \leftarrow$   
 division by 0 is undefined!

24. What is the value of  $\theta$  for the illustrated angle?



26. Solve the equation for  $\theta$  in degrees:  
 $\tan \theta = -\sqrt{3}$

$\tan \theta = \frac{y}{x} = \frac{-\sqrt{3}}{1}$   
~~120° or 300°~~  
 120° or 300°

looking at #17